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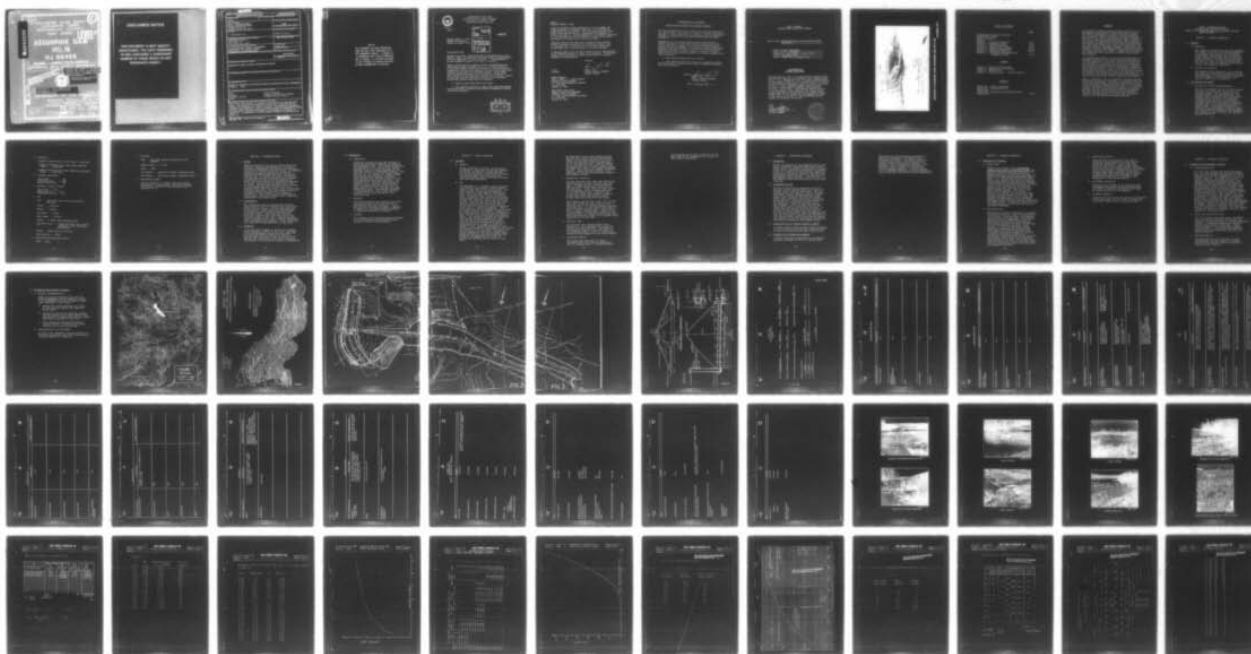
NEW JERSEY STATE DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/2  
NATIONAL DAM SAFETY PROGRAM. ASSUMPINK DAM, NUMBER 18 (NJ 00452--ETC(U)  
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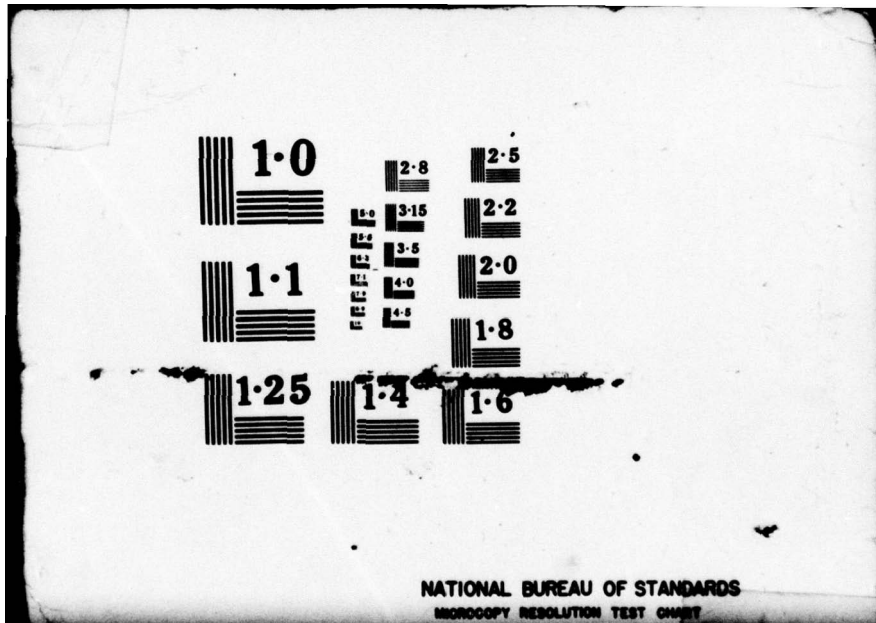
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DELAWARE RIVER BASIN  
ASSUNPINK CREEK  
MONMOUTH COUNTY  
NEW JERSEY

LEVEL II

# ASSUNPINK DAM NO. 18 NJ 00452

## 6 PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM.

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Assunpink Dam, Number 18 (NJ 00452).  
Delaware River Basin. Assunpink Creek,  
Monmouth County, New Jersey. Phase 1  
Inspection Report.

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DEPARTMENT OF THE ARMY

Philadelphia District  
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Dams Spillway Structural Analysis Safety  Visual Inspection National Dam Inspection Act Report Assunpink Dam, No. 18 N.J.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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7 MAY 1979

Honorable Brendan T. Byrne  
Governor of New Jersey  
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Assunpink Dam No. 18 in Monmouth County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Assunpink Dam No. 18, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken:

- a. Repair and seed eroded areas on all slopes.
- b. Place additional barriers at access points around the perimeter of the dam in order to prevent erosion caused by unauthorized vehicular use of the dam surfaces.

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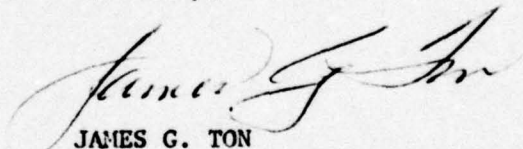
Honorable Brendan T. Byrne

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Frank Thompson, Jr. of the Fourth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed action taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON  
Colonel, Corps of Engineers  
District Engineer

1 Incl .  
As stated

**Copies furnished:**

Dirk C. Hofman, P.E., Deputy Director  
Division of Water Resources  
N. J. Dept of Environmental Protection  
P. O. Box CN029  
Trenton, NJ 08625

John O'Dowd, Acting Chief  
Bureau of Flood Plain Management  
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ASSUNPINK DAM NO. 18 (NJ00452)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 4 January 1979 by Louis Berger and Associates, Inc. under contract to the State of New Jersey. The state, under agreement with the U. S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Assunpink Dam No. 18, initially listed as a high hazard potential structure but reduced to a low hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. The low hazard potential classification means that in the event of failure of the dam, no loss of life and only minimal economic loss is expected. However, to assure the continued functioning of the dam and its impoundment, the following remedial actions could be undertaken:

- a. Repair and seed eroded areas on all slopes.
- b. Place additional barriers at access points around the perimeter of the dam in order to prevent erosion caused by unauthorized vehicular use of the dam surfaces.

APPROVED: \_\_\_\_\_

JAMES G. TON  
Colonel, Corps of Engineers  
District Engineer

DATE: \_\_\_\_\_

2 May 79

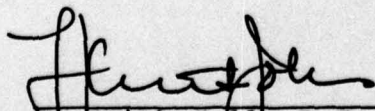
PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Name of Dam Assunpink Dam No. 18 Fed ID# NJ 00452  
NJ ID# 591

State Located New Jersey  
County Located Monmouth  
Coordinates Lat. 4012.3 - Long. 7427.9  
Stream Assunpink Creek  
Date of Inspection 4 January 1979

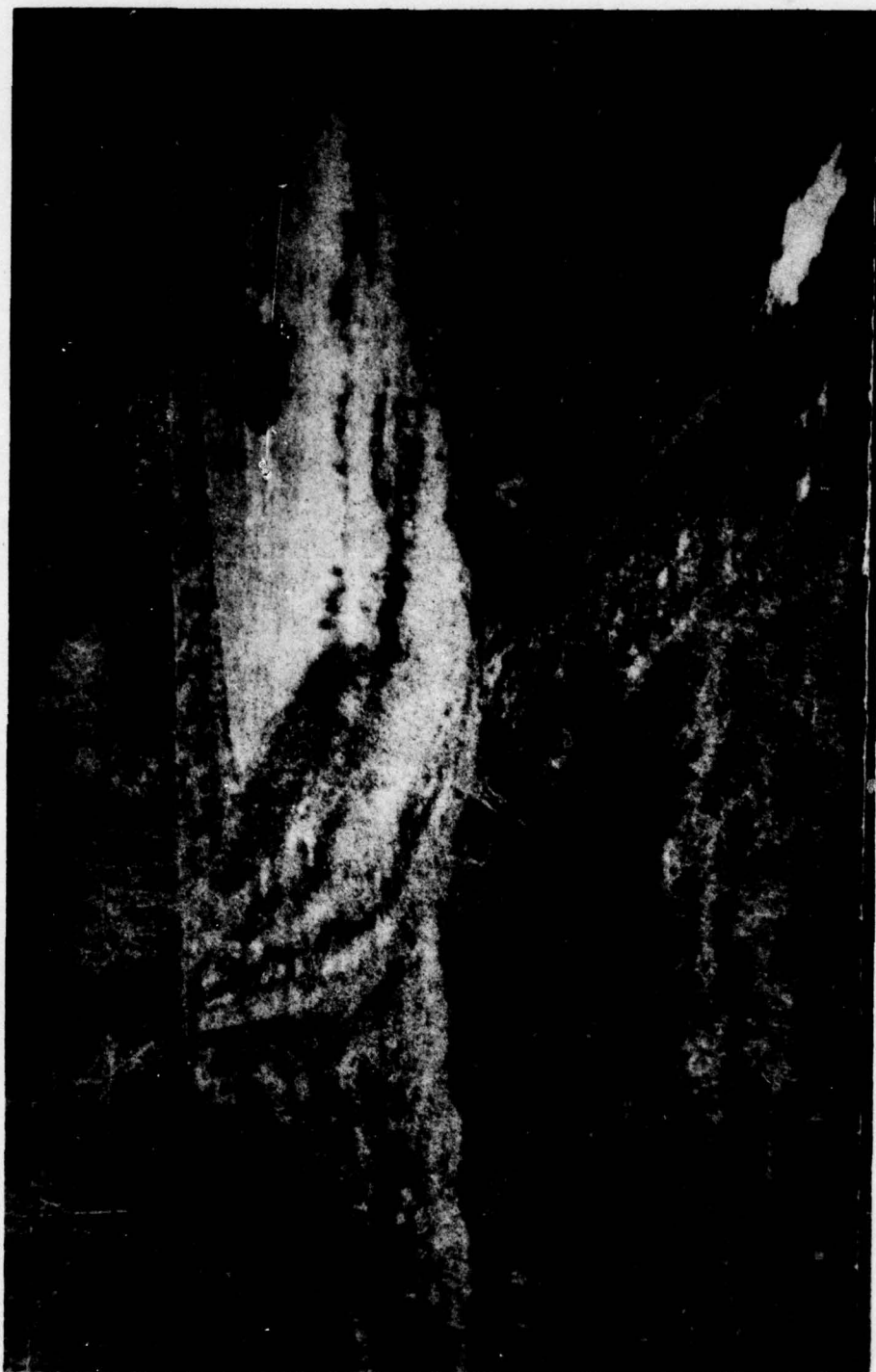
ASSESSMENT OF  
GENERAL CONDITIONS

Assunpink Dam No. 18 is in a good overall condition and has spillway capacity to accommodate the 100-year design flood. It is recommended that its hazard classification be downgraded to low as it is situated within an official Fish and Wildlife Management Area and there is no danger of loss of life or property damage should the dam collapse. No detrimental findings were uncovered to merit further study. Recommended remedial actions to be undertaken in the future as part of the State maintenance program include repair and seeding of the eroded areas of all slopes and the placement of additional vehicular barriers at the accessible points around the perimeter of the dam.

  
F. Keith Jolls P.E.  
Project Manager







OVERVIEW OF ASSUNPINK CREEK WATERSHED DAM SITE #18

DECEMBER, 1978

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## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
NAME OF DAM: ASSUNPINK DAM SITE NO. 18 FED #NJ00452  
AND NJ ID #591

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with Contract FPM-36 between Louis Berger & Associates, Inc. and the State of New Jersey and its Department of Environmental Protection, Division of Water Resources. The State, in turn, is under agreement with the U.S. Army Corps of Engineers, Philadelphia to have this inspection performed.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the structural and hydraulic condition of the Assunpink Dam No. 18 and appurtenant structures, and to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The dam at Assunpink Site No. 18 (a/k/a Rising Sun Lake) is a three zone, 1,400 foot long earthen structure with an impervious soil upstream blanket, core and cutoff key. The upstream face is protected by riprap between elevations 163 and 175.5. The principal discharge outlet consists of a drop inlet structure containing a two-stage reinforced concrete riser, a 30-inch diameter reinforced concrete pipe, and a reinforced concrete impact basin. A trapezoidal auxiliary spillway with a negative approach slope is located just beyond the left abutment. The embankment has a maximum height of 38 feet to the crest elevation of 179.5.



b. Location

The dam is located on the Assunpink Creek in Millstone Township, Monmouth County and is approximately nine-tenths of a mile southeast of Roosevelt and one and four-tenths miles north of Stone Tavern. It is approximately 3,400 feet upstream from Monmouth County Bridge No. 80 which crosses Assunpink Creek on an unnamed road between Roosevelt and Stone Tavern. The dam is roughly 7 miles east of Interchange 7A on the N.J. Turnpike.

c. Size Classification

The dam at Site No. 18 has a maximum height of 38 feet and a maximum storage capacity of 730 acre-feet. Accordingly, this dam is in the small size category as defined by the criteria in the Recommended Guidelines for Safety Inspection of Dams (storage less than 1,000 acre-feet and height less than 40 feet).

d. Hazard Classification

The dam is located in a fish and game wildlife area. The only structure between this dam and another larger flood control structure (Site No. 4) downstream is a small secondary road bridge. The downstream flood plain is uninhabited and accordingly, this dam is recommended to be downgraded to a low hazard classification. If this dam should collapse and completely discharge its total storage of 730 acre-feet into the reservoir at Dam No. 4, little effect would be felt as Dam No. 4 has a storage capacity of over 3,000 acre-feet above spillway crest and a large auxiliary spillway. Further, there is no development below Dam No. 4.

e. Ownership

This dam is owned by the State of New Jersey, Department of Environmental Protection, Division of Fish, Game, and Shellfisheries, Trenton, New Jersey.

f. Purpose of Dam

The purpose of the dam is floodwater retention, sediment storage, wildlife management, and recreation.

g. Design and Construction History

The dam was designed in 1967 by the SCS as part of the Assunpink Creek Watershed floodwater retention program and was constructed under the authority of the Watershed Protection and Flood Prevention Act (PL 566). The final plans were approved in December of 1967. Construction of the dam was initiated in May 1970 and completed in September 1971 by E.J. Crosby Company Inc., General Contractors, Fort Monmouth, New Jersey.

h. Normal Operating Procedures

The dam is maintained by personnel of the N.J. Division of Fish and Game but there are no routine, day-to-day, operational procedures performed. The water level in the lake is regulated at the direction of the Bureau of Fisheries with changes occurring only once or twice a year. These are accomplished by adjusting the gate height in the concrete riser of the drop inlet structure.

1.3 PERTINENT DATA

a. Drainage Area

Assunpink Site No. 18 has a drainage area of 1.2 square miles which consists of woodland, cropland and meadowland.

b. Total spillway capacity at maximum pool elevation - 1,350 cfs

c. Elevations (ft. above MSL)

Top of dam - 179.5  
Principal spillway crest - 172.2  
Auxiliary spillway crest - 176.2  
Streambed at centerline of dam - 141.5+



d. Reservoir

Length of maximum pool (top of dam) -- 3,980 feet

Length of recreation pool (principal spillway crest) - 3,580 feet

Length of flood control pool (auxiliary spillway crest) - 3,760 feet

e. Storage (acre-feet)

Top of dam - 730

Recreation pool - 346

Flood control pool - 537

f. Reservoir Surface (acres)

Top of dam - 65.5

Recreation pool - 37.8

Flood control pool - 54.3

g. Dam

Type - Earth with drop inlet and auxiliary spillway

Length - 1,400 feet

Height - 38 feet

Top Width - 15 feet

Side Slopes - 2.5H:1V

Zoning - 3 zones (see attached plans)

Impervious Core - Clayey and silty sand (SC-SM) compacted to 95% of maximum dry density.

Cutoff - Keyed section with core.

Grout curtain - None

h. Diversion and Regulating Tunnel

Type - None

i. Spillway

Type - Auxiliary channel excavated at left abutment.

Channel width - 75 feet

Gates - None

U/S Channel - Negatively sloped, vegetated inlet

D/S Channel - Positively sloped, vegetated outlet

j. Regulating Outlets

Primary outlet is a 2 stage, drop inlet structure with a 30-inch diameter reinforced concrete outlet pipe. Principal inlet spillway crest at elevation 172.2.



## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

Complete details of the initial design report and work plan, hydraulic determinations, structural analyses and subsurface information were available at the Soil Conservation Service offices (in Somerset) together with as-built plans and the various corrective measures undertaken since the initial construction. All design was done in accordance with SCS criteria and was discussed with engineering personnel of their staff who explained in detail the various design and operational features of the dam, particularly the hydraulics of the spillways. The main spillway drop inlet structure is a two-stage deep-well concrete riser of a standard design developed by the Saint Anthony Falls Hydraulic Laboratory. The impact basin is also of a standard design developed by the Bureau of Reclamation. (This type of energy dissipator is rather widely used and functions almost completely independent of tailwater head).

### 2.2 CONSTRUCTION

The construction closely followed the contract plans except 8" pipe was substituted in the under-drains for the 6" pipe. The SCS supervised the construction on lands acquired by the Department of Conservation and Economic Development with Green Acres funds. There have been no major structural modifications since the initial construction except in 1977 when a manhole and additional subsurface drains were installed immediately above the impact basin headwall. Stone riprap was also placed on the upstream face at this time.

### 2.3 OPERATION

As the principal purpose of the dam is to reduce urban flooding in Trenton as well as to establish a wildlife management and recreational area, the multi-purpose operation appears to function properly under the aegis of the Division of Fish and Game who regulate the water level seasonally. (See Section 4 for additional operation information).

## 2.4 EVALUATION

### a. Availability

Sufficient engineering data was obtained to assess the structural stability in regard to the embankment zones. The foundation stability was delineated in the various soils reports prepared by the SCS (which analyzed all geotechnical aspects in considerable detail). The site lies in the coastal plain physiographic province and is situated in a valley carved from the Red Bank, Navesink, and Mount Laurel-Wenonah sand formations and is filled with Quaternary glauconitic alluvium. The thickness of the alluvial material does not exceed 12 feet. The Mount Laurel-Wenonah sand, which underlies the entire site to a depth exceeding 65 feet, has some very high permeability rates. The Navesink formation of the abutments is fairly tight and was utilized as the borrow source for the impervious core.

### b. Adequacy

The field inspection and review of the available design plans reveal that the dam is structurally sound and well-built. It is believed that the data available is adequate to render this assessment without recourse to gathering additional information.

### c. Validity

The validity of the engineering data available is not challenged and is accepted without recourse to further investigations.



## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

Visual inspection of Dam No. 18 took place on January 4, 1979 with engineering personnel of the SCS and Division of Fish and Game. The overall condition of the dam was reviewed with its designers who pointed out the localized problem areas and remedial measures that have been undertaken.

#### b. Dam

The embankment is a slightly curved structure lying between two naturally higher abutment zones on each side of the river channel. The plans indicate a three-zoned embankment to which riprap has been added on the upstream face. The slopes have a fairly continuous cover of grass but there are bare areas where unauthorized vehicular traffic has rutted the 15-foot wide crest and side slopes and caused erosion. Near the left end of the dam, the back slopes blend into the natural higher terrain which is covered by brush and numerous trees (up to 14 inches in diameter). There is an extensive wet area beyond the toe of slope and upward seepage was observed. Seepage was also observed in an area below the spillway outfall. The toe drain outlet pipes were flowing freely. SCS engineers informed the inspectors that several years ago seepage was noted near the top of the outfall wings, which necessitated the installation of additional sub-surface drains in order to lower the phreatic level. An orange precipitate (iron sludge) is continuously being formed in the drains. This appears to be of a substantial amount and occurs naturally at this site. Seepage was further observed in the natural higher ground beyond the auxiliary spillway (near the left abutment) and apparently is percolating through the permeable natural soils in this area.

Although there are no major undercut areas, the vehicular traffic has done considerable damage to the graded slopes and in one area, a dirt road has been actually established due to the repeated usage. Numerous patches of "ice flowers" were noticed on the frozen backslopes but these are most probably caused by recent rains rather than deeper, subsurface seepage. Riprap has been displaced on the upper zone of the foreslope directly opposite the deepwater intake.

c. Appurtenant Structures

The main spillway riser tower and outfall are located roughly 380 feet from the left abutment. The upper portion of the reinforced concrete riser and the impact basin are in good condition. There are clear trash racks at each opening and the stem-operated gate is in good working order. There is some erosion just below the downstream wingwalls of the impact basin and earlier erosion pockets have been backfilled with riprap.

The emergency spillway has a wide (75') bottom width and a level 30' long crest 3.3 feet below the top of dam where it passes over the centerline axis. An interceptor drain has been installed along the west side of the channel below a higher diversion dike. Similar to the main embankment, considerable portions of the spillway slopes are grassed but bare areas exist where vehicles have rutted out the ground cover, especially on the dam axis.

d. Reservoir Area

The reservoir area extends almost three quarters of a mile upstream and is clear of debris along the shorelines. The banks are on moderate slopes and in an area which is quite heavily wooded. There is a small boat launching beach adjacent to the right abutment.

e. Downstream Channel

The flood plain area below the dam is uninhabited and quite heavily wooded, but flow is unimpeded until it reaches Monmouth



County bridge No. 80 about 3,500 feet to the west. Most of the downstream area is part of the wildlife reservation.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

Dam No. 18 functions as the uppermost part of the overall Assunpink Creek Watershed flood control system as well as providing a wildlife and recreational area. Operational procedures are governed by the N.J. Division of Fish and Game, Bureau of Fisheries who prescribe changes in the lake level periodically during the year. The Regulation is performed by field personnel of the N.J.D.F. & G. who manually adjust the gate opening in the inlet structure.

### 4.2 MAINTENANCE OF DAM

The dam is maintained by personnel of the N.J. Division of Fish and Game whose field office is located a short distance downstream. They are responsible for all aspects of the dam's upkeep and safety including grounds keeping, riprap repair, inlet structure operation and repair, impact basin maintenance and routine patrolling and inspection. A recurring problem appears to be the use of unauthorized vehicles on the dam embankment. These vehicles have created deep erodable ruts in the shell material surfacing both the dam and auxiliary spillway. A barrier has been erected across the crest of the dam to prevent passage but this appears to be only minimally effective. Minor defects such as this are corrected as required, but problems of a more serious nature involving structural aspects are referred to the Soil Conservation Service for additional investigation and remedial action.

### 4.3 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No formal warning system exists although personnel of the Division of Fish and Game regularly patrol the dam in conjunction with their other duties.

### 4.4 EVALUATION OF OPERATIONAL ADEQUACY

A formal inspection is performed by engineering personnel of NJDFG and SCS on an annual basis.



The operational and maintenance procedures in effect are considered to be adequate and efficiently performed. The design inherently provides flood control (and dam protection) without attendant operational personnel. Consequently, the only operations required are limited to those necessary for recreational and environmental purposes. A warning system is not considered necessary since the downstream area is also part of the same wildlife reservation.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

#### a. Design Data

Based on the criteria in the Recommended Guidelines for Safety Inspection of Dams, the 100-year frequency event was selected as the design storm by the inspecting engineer. Precipitation data was obtained from Technical Paper 40 and NOAA Technical Memorandum NWS Hydro - 35. Storage data and time of concentration were obtained from the Soil Conservation Service design calculations and reviewed in the context of the above inspection criteria. Inflow to the reservoir for the selected 100-year storm was computed utilizing the HEC-1 computer program. This gave a peak inflow to the reservoir of 1,730 cfs. Routing this through the controlled-release reservoir reduced the peak to 240 cfs. The combined spillways have a maximum discharge capacity of approximately 1,350 cfs before overtopping occurs and can therefore accommodate the design flood. The depth of overflow in the auxiliary spillway is less than one foot for the design discharge.

#### b. Experience Data

The dam was originally designed for a 100-year frequency storm using a time of concentration of 1.5 hours. There has been no overtopping since the dam was constructed. The auxiliary spillway height is established so that no design flow (according to SCS procedures) ever reaches the spillway crest; the spillway is truly an emergency, auxiliary safety feature. In the original design, annual flood peak discharges were obtained from USGS records for 1924-58 from gaging data in Trenton, and detailed hydraulic analyses, including infiltration studies, were exhaustively performed by the SCS to quantify final design values against the economical apportionment of the dam. The closed conduit spillway system with a multi-stage drop inlet riser was selected and used on all dams within the Assunpink watershed.



c. Visual Observations

With the water at low stage at the time of inspection, approximately 5 cfs was flowing out of the 30" outfall. This conduit was partially blocked with riprap at the impact basin but this can be easily removed. Although no flow has ever been transmitted by the auxiliary spillway, the break in gradient of the discharge section could create an erosion problem if heavy flows were ever discharged. Visual observations confirmed all the aspects and assumptions of the original design.

d. Overtopping Potential

As there are no records of the dam having been overtopped and the main and auxiliary spillway can easily accommodate the design flood, there is little potential for overtopping.

e. Drawdown Potential

Using the 12"x12" sluice gate opening at the bottom of the riser tower (at El. +145), it would take less than 9 days to draw the reservoir down.

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

In view of the relative age of the dam embankment, the well-designed and supervised construction and the continuous maintenance, the dam at Assunpink Site No. 18 is deemed to be in a good overall condition. The upper zones of the recently placed riprap protection show little evidence of subgrade subsidence and the main embankment crest and adjoining cut slopes along the auxiliary spillway are at true design grade and are marred only by vehicular rutting. The inspection team noted the continual maintenance problem of backslope erosion and apparent seepage at the downstream toe. The toe drains in the vicinity of the impact basin appear to be under a continuous but modest head due to seepage and percolation. Additionally, there are several natural thalwegs beyond the dam where considerable percolation through the natural banks were observed. In summary, nothing was visually noted to create or worsen a hazardous condition that cannot be readily maintained or corrected. The only drainage element not visible for inspection was the lower portions of the intake riser.

#### b. Design and Construction Data

From the review of the soils report recommendations and contract plans for the initial construction, the design appears to be well-engineered, reflects a conservative approach and employed conventional analytical techniques. Based upon the condition of the dam and the hazard classification, it is believed that additional design studies are unnecessary under the purview of PL 92-367.

#### c. Operating Records

The performance of this structure has been satisfactory since its completion, although certain normal remedial repairs and modifications have been required.



d. Post Construction Changes

There have been no major modifications since the 1977 addition of the riprap protective blanket.

e. Seismic Stability

The dam is located in Zone 1 and has negligible potential vulnerability to seismic loadings, as the experience of the inspection team indicates that dams in Zone 1 will have adequate stability under dynamic loading conditions if stable under static loading conditions.

SECTION 7 - ASSESSMENTS/RECOMMENDATIONS/  
REMEDIAL ACTIONS

7.1 DAM ASSESSMENT

a. Safety

Subject to the inherent limitations of the Phase I visual inspection, Assunpink Dam No. 18 is judged to be in a good overall structural condition. Overtopping of the dam is a very remote possibility and no seriously detrimental conditions were observed. The dam is recommended to be placed in a low hazard category due, in part, to its location within the officially designated State Fish and Wildlife Management area. The downstream floodplain is uninhabited.

b. Adequacy of Information

The information made available by the Soil Conservation Service is deemed to be adequate regarding the analyses and evaluation of safe operation and structural stability.

c. Urgency

No immediate urgency is attached to implementing any further studies or the remedial measures set forth below.

d. Necessity for Further Study

In view of the overall condition of this dam and the fact that it is continually monitored by trained engineering personnel, additional inspections under the purview of P.L. 92-367 are deemed to be unnecessary. The Division of Fish and Game, in conjunction with SCS engineers, maintains an internal system of annual inspections and emergency action plans which basically reflect the requirements mandated under P.L. 92-367.



## 7.2 RECOMMENDATIONS/REMEDIAL MEASURES

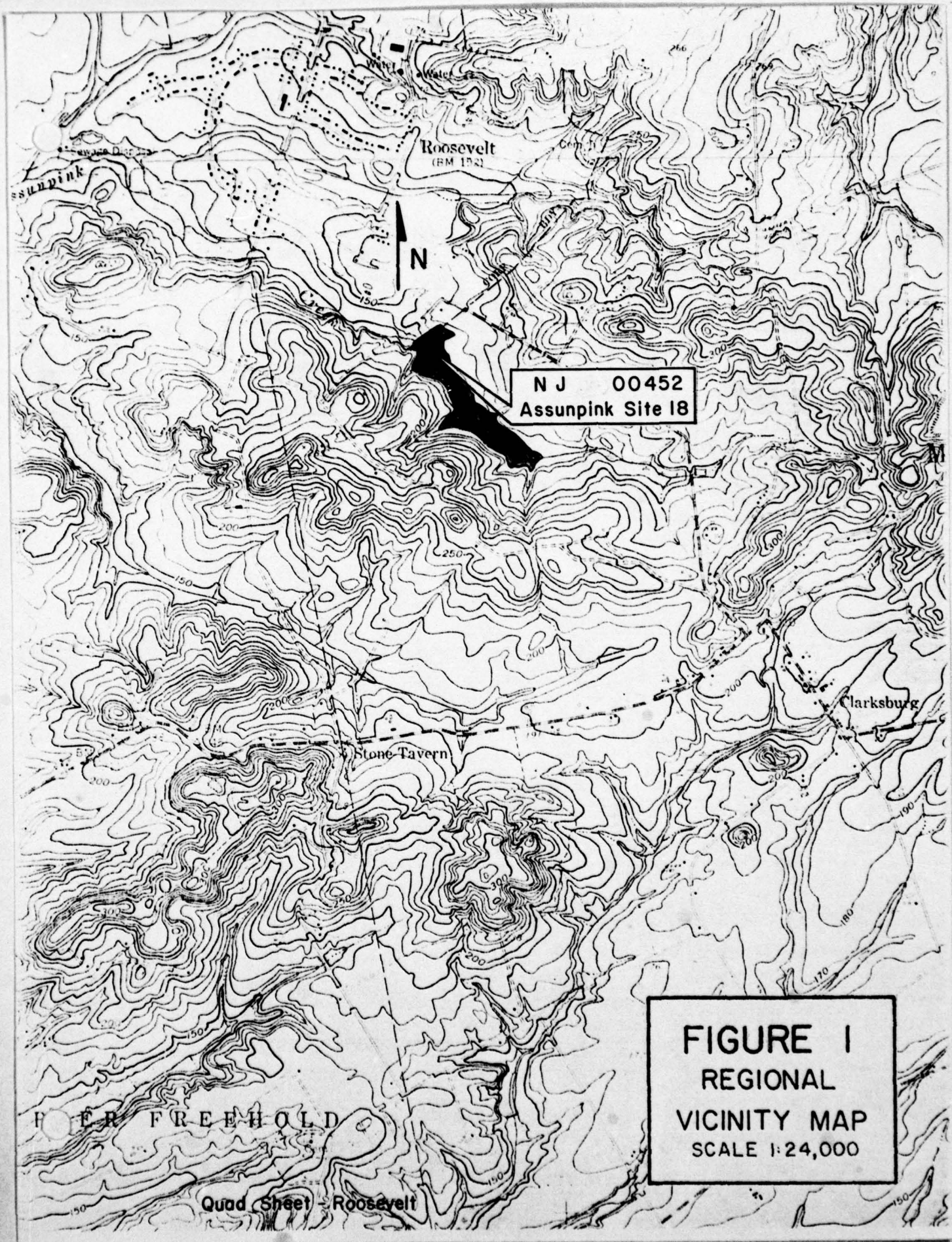
### a. Remedial Recommendations

Under the present Assunpink Creek Fish and Wildlife Management Area maintenance program, it is recommended that the following be taken under advisement in the future:

- Regrade the eroded backslopes and sides of the auxiliary channel and reseed the barren areas.
- Continue to monitor the backslope seepage and the subgrade drains which appear to be susceptible to clogging with the iron sludge that occurs naturally at this site.
- Place additional vehicular barriers at various locations to inhibit the illegal vehicular use of the dam surfaces.

### b. O&M Maintenance and Procedures

In view of the assessment contained herein, no additional procedures other than those presently in effect appear to be required.



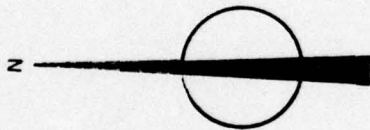
**FIGURE 1**  
**REGIONAL**  
**VICINITY MAP**  
**SCALE 1:24,000**



# PROJECT MAP

## ASSUNPINK CREEK WATERSHED

### MERCER AND MONMOUTH COUNTIES, NEW JERSEY



0 2000' 4000' 6000' 8000'  
FEET

- Watershed Boundary
- County Line
- Township Line
- City Limits
- Streams
- Railroads

#### PROJECT MEASURES

- Floodwater retarding structure
- Multiple-purpose structure
- FW - Fish and Wildlife
- R - Recreation

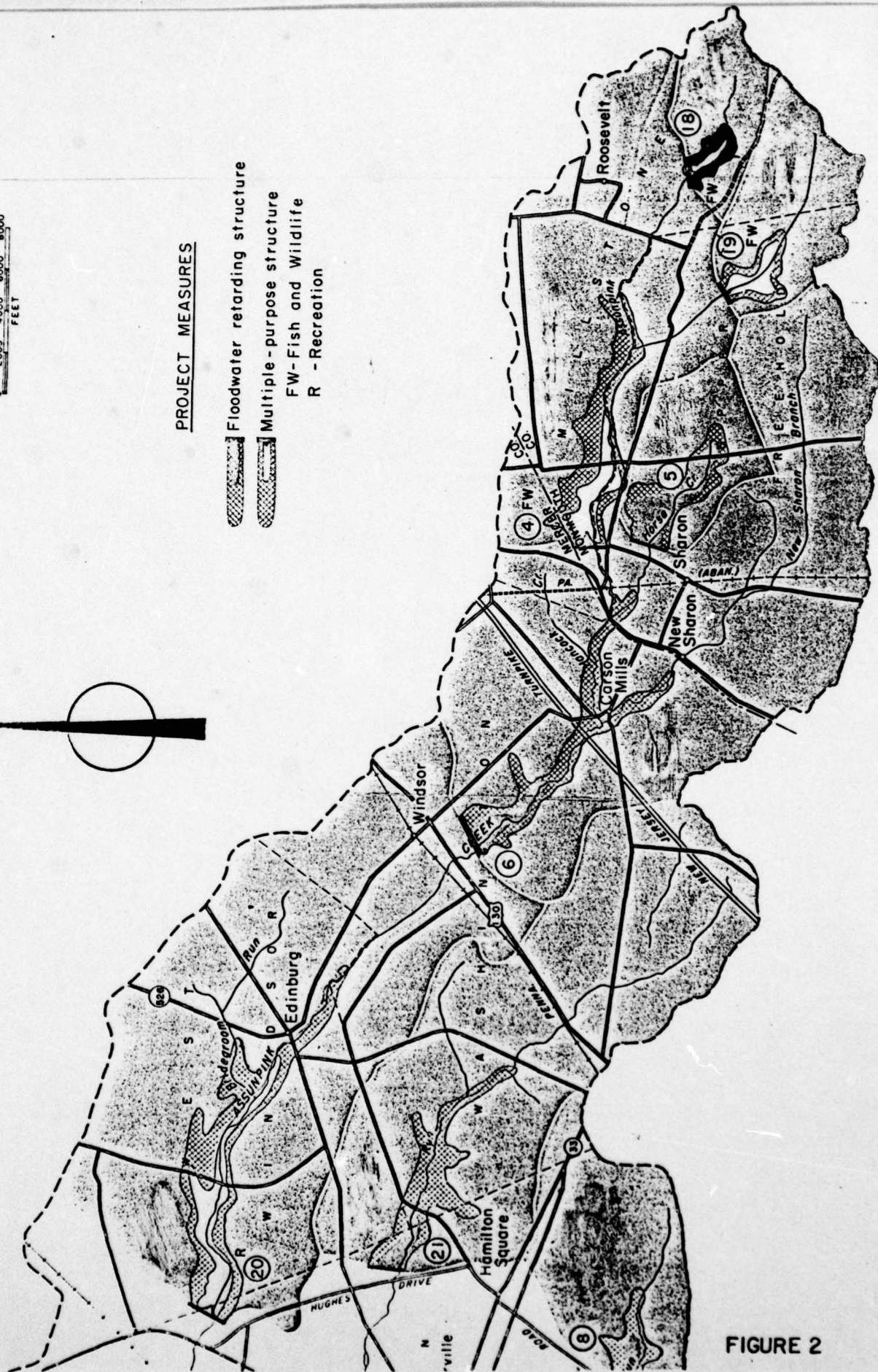


FIGURE 2

• (TOWN SHIP - ROAD)

SPOL  
DISPOSA

EXCAVATE FOR WILDLIFE HOLDING POND  
2'x30'x3' BELOW CHANNEL BOTTOM.  
FINAL LOCATION OF WILDLIFE HOLDING  
POND WILL BE IN THE E OF THE  
STREAM APPROX 200' DOWNSTREAM  
FROM THE E OF THE DAM.

CLEARING & GRUBBING

BERM

BLANKET AREA

RISER DETAIL

CONA - FAN  
FON D



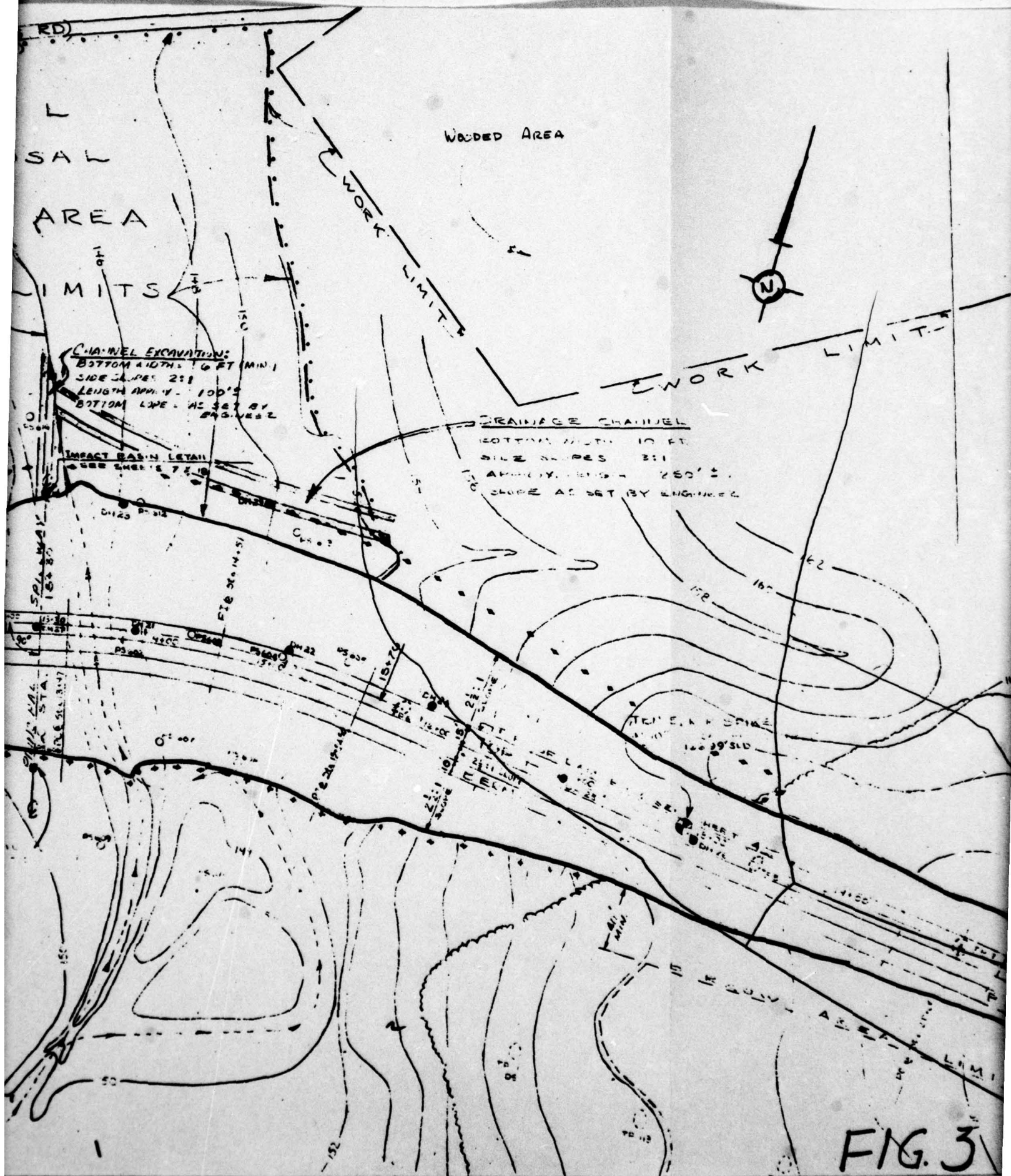


FIG. 3

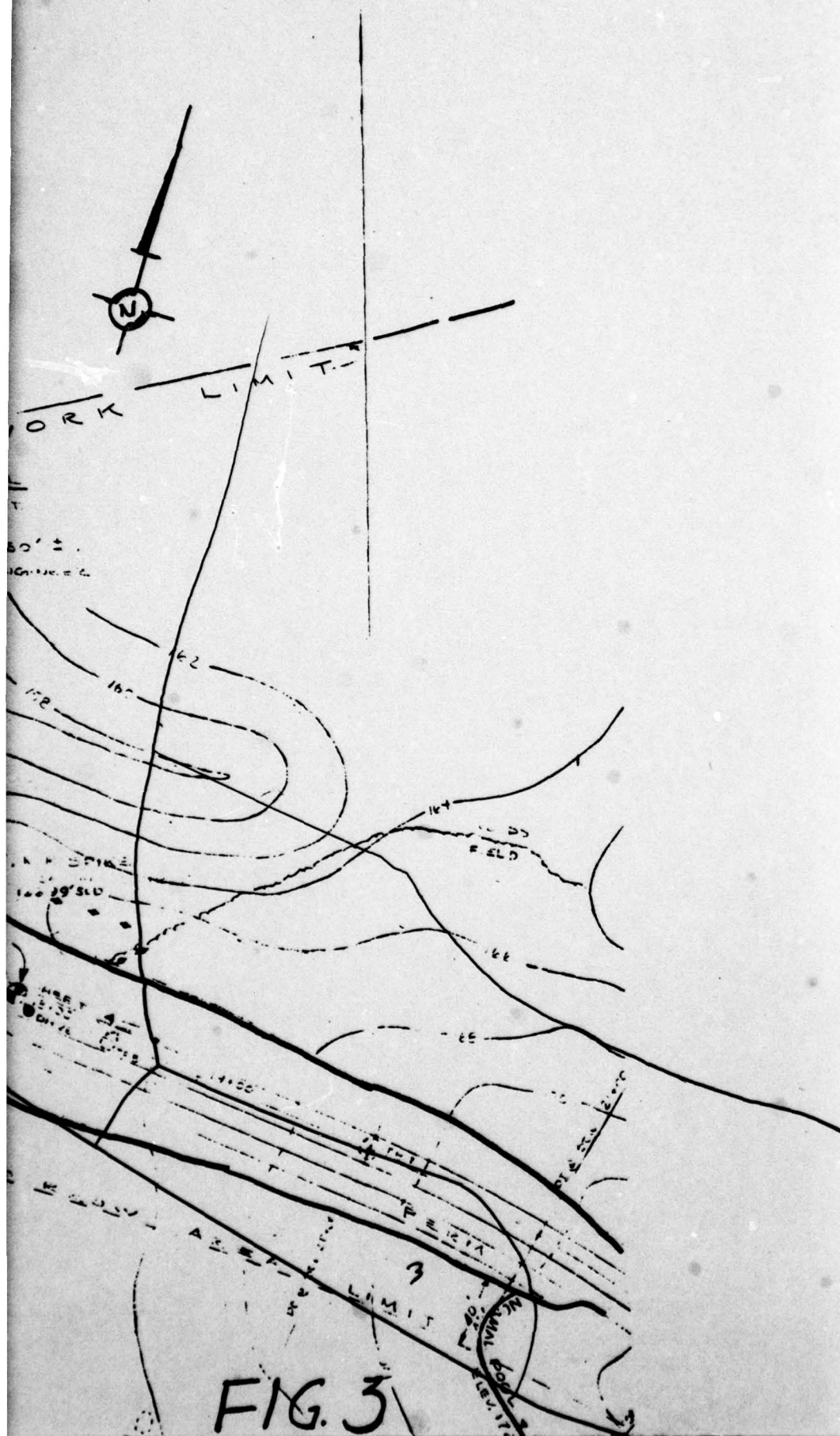
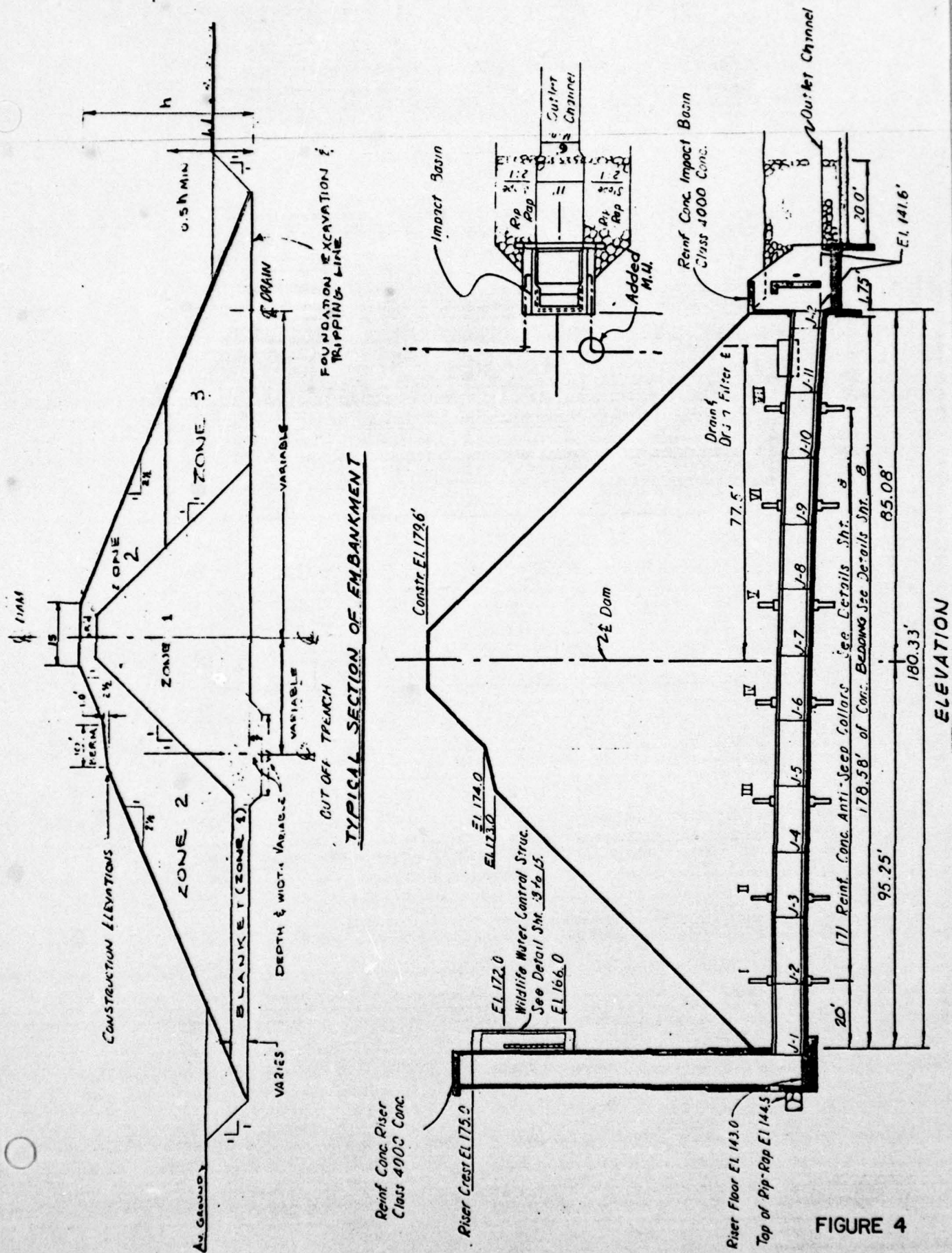


FIG. 3





Check List  
Visual Inspection  
Phase 1

Name Dam Assumpink #18 County Monmouth State New Jersey Coordinators NJDEP

Date(s) Inspection 1/4, 18/79 Weather Sunny Temperature 15° F

Pool Elevation at Time of Inspection 172 M.S.L. Tailwater at Time of Inspection 143.5 M.S.L.

Inspection Personnel:

<u>T. Chapter</u>	<u>F. Schmidt (NJDEP)</u>	<u>K. Jolls</u>
<u>E. Simone</u>	<u>L. Holt (SCS)</u>	<u></u>
<u>L. Baines</u>	<u></u>	<u></u>

L. Baines Recorder

Dam No. 00452



133K  
SHEET 1

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE ON LEAKAGE	N/A	
STRUCTURE TO ADJUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MONOLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	



# EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

## SURFACE CRACKS

None observed

## UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE

Sloughing at spillway.  
Structure alongside both  
wingwalls and immediately  
adjacent channel.

Spillway structure located at  
low point of toe.  
Sloughing has been filled with  
6"-10" riprap.

## SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES

Minor erosion on surface of  
downstream embankment. Some  
caused by tire ruts.

No major sloughing other than  
that noted above.

## VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST

Satisfactory

Tire ruts on top of crest.

## RIPRAP FAILURES

New riprap added last year  
(spring 1977). Riprap  
displaced directly above outlet  
conduit. A path approximately 2'  
wide from the embankment crest to  
lake level removed.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Stand of trees 50' below downstream left embankment. Stream 55' from toe of right abutment 25'-30' wide. Mature trees 40' from toe of right embankment.	
	Right abutment - embankment grade into natural slope (parking area) - junction satisfactory. Left abutment terminated at left wall of emergency spillway. Left wall of spillway is natural slope of land which rises abruptly. Minor erosion due to motorcycle tracks.	
ANY NOTICEABLE SEEPAGE	Heavy orange, precipitate noted.	Seepage downslope of left embankment - occurred below tree level. Could be a combination of seepage and natural runoff. (infiltrated railway) Ground saturated and water flowing towards downstream channel. Numerous patches of "ice flowers" along channel probably caused by recent rain. Water expelled to surface by frost.
STAFF GAGE AND RECORDER		Heavy seepage behind wingwalls (approximately 2 g pm) attributed to french drains (heavier on right side than left).
DRAINS		2 toe drains joined at manhole immediately above spillway structure. Drains into right wingwall drain. The one on the left wingwall services small portion of left embankment. Heavy flow from right drain. Light from left.



# OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed	Structure in good condition.
INTAKE STRUCTURE	Drop inlet with box riser. Gate stem operated. Gating and trash racks on three sides.	All appear in good condition.
OUTLET STRUCTURE	R/C concrete discharge structure with impact basin in front of discharge pipe. Discharge pipe partially blocked by riprap caused by vandalism.	Erosion behind wingwalls. Back filled with riprap. Sloughing of channel banks abutting wingwalls also filled with riprap.
OUTLET CHANNEL	Narrow steep sided channel. Natural slopes - some sloughing on side of channel.	Channel 15'-20' wide. 45° slope 10' high.
EMERGENCY GATE	None	

# UNCATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	None	Emergency spillway wide grassy channel to the left of the left embankment.
APPROACH CHANNEL	Wide grassy channel over natural terrain.	Left wall of emergency spillway high natural slope deeply rutted with vehicle tracks eroded.
DISCHARGE CHANNEL	Same as above	Natural spring entering lake at the far left of left embankment. Toe drain of emergency spillway left wall discharges into approach channel and drains into lake heavy orange. Precipitate noted. Right wall of channel breached by vehicles at junction of embankment.
BRIDGE AND PIERS	Small bridge about 3500' downstream.	County Bridge No. 80 timber piled abutments and wingwalls.



**GATED SPILLWAY**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE AND PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

# INSTRUMENTATION

VISUAL EXAMINATION MONUMENTATION/SURVEYS	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	Monument on top of right embankment to be checked on plans.	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	



RESERVOIR

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

SLOPES

Flat gently sloping natural terrain on right heavily wooded. Somewhat steeper on left.

Reservoir area - small. Sandy beach or boat launching immediately adjacent to right abutment at lower elevation than embankment. Rises gently to parking area.

SEDIMENTATION

None noted.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF

CONDITION  
(OBSTRUCTIONS,  
DEBRIS, ETC.)

OBSERVATIONS

High sloped channel approximately  
10' high and 12' wide. Small con-  
stricted bridge crossing where  
Roosevelt Road crosses channel.  
(County Bridge No. 80)

REMARKS OR RECOMMENDATIONS

Downstream area heavily wooded.  
Entire area part of wildlife  
reservation.

SLOPES

High steep sloped ( $45^{\circ}$ ).

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

Town of Roosevelt downstream but not  
in floodplain.  
(None)



CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Available (Information available from Soil Conservation Service, 1370 Hamilton Street, Somerset).
REGIONAL VICINITY MAP	Available
CONSTRUCTION HISTORY	Available
TYPICAL SECTIONS OF DAM	Available
HYDROLOGIC/HYDRAULIC DATA	Available
OUTLETS - PLAN	Available
- DETAILS	
- CONSTRAINTS	
- DISCHARGE RATINGS	
WAINFALL/RESERVOIR RECORDS	None kept

ITEM REMARKS

DESIGN REPORTS

Available

GEOLOGY REPORTS

Available

DESIGN COMPUTATIONS  
HYDROLOGY & HYDRAULICS  
DAM STABILITY  
SEEPAGE STUDIES

Available  
Available  
Not available  
Not available

MATERIALS INVESTIGATIONS  
BORING RECORDS  
LABORATORY  
FIELD

Yes  
Yes  
Available

POST-CONSTRUCTION SURVEYS OF DAM

None made

BORROW SOURCES.

Yes



ITEM REMARKS

MONITORING SYSTEMS

None

MODIFICATIONS

Yes

HIGH POOL RECORDS

Not recorded

POST CONSTRUCTION ENGINEERING  
STUDIES AND REPORTS

1976 plans, reports etc. of excessive seepage and drain  
modifications available from SCS.

PRIOR ACCIDENTS OR FAILURE OF DAM  
DESCRIPTION  
REPORTS

None

MAINTENANCE  
OPERATION  
RECORDS

No records kept



ITEM

REMARKS

SPILLWAY PLAN

Available

SECTIONS

Available

DETAILS

Available

OPERATING EQUIPMENT  
PLANS & DETAILS

Available





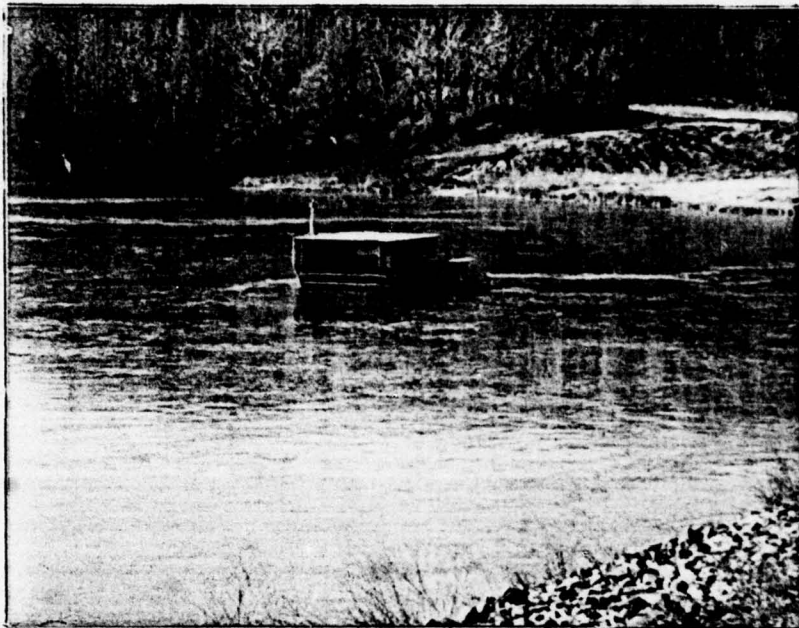
January, 1979

Assunpink Creek Watershed Dam Site #18



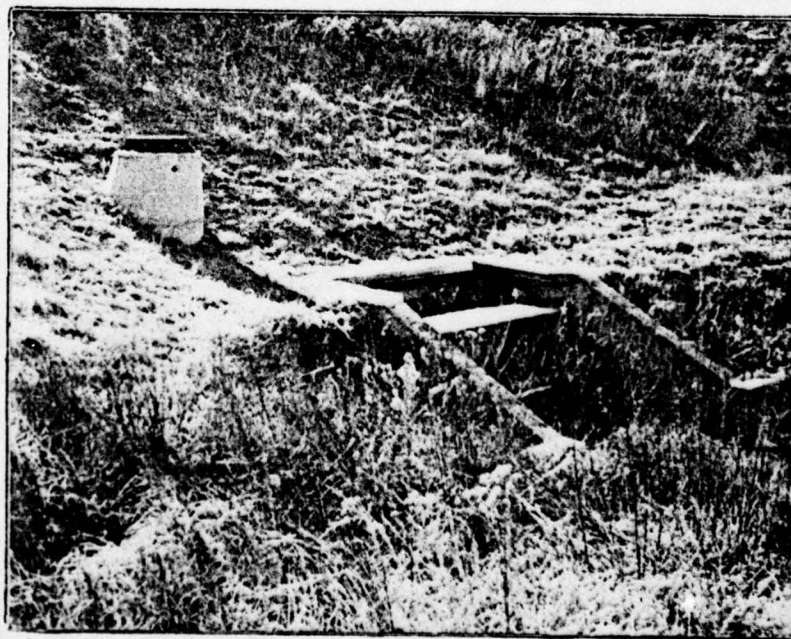
January, 1979

Stream at toe of right embankment



Intake structure

January, 1979



Outlet structure

January, 1979





January, 1979

Auxiliary spillway



January, 1979

Auxiliary spillway inlet



January, 1979

Seepage at toe of left embankment



January, 1979

Displaced riprap directly opposite intake structure





January, 1979

Erosion of auxiliary spillway embankment



January, 1979

Bridge downstream from dam

Dam No. 00452

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA.  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.2 sq.miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 172.2 (346 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 176.2 (537 acre-feet)

ELEVATION MAXIMUM DESIGN POOL: 175 (SCS records)

ELEVATION TOP DAM: 179.5

CREST: \_\_\_\_\_

- a. Elevation 176.2 M.S.L. (Auxiliary Spillway)
- b. Type Vegetated auxiliary spillway channel
- c. Width 75 foot wide channel
- d. Length 750 foot long channel
- e. Location Spillover Left abutment
- f. Number and Type of Gates None

OUTLET WORKS: Principal Spillway

- a. Type 2 stage drop inlet with 30"  $\phi$  reinforced concrete pipe
- b. Location Station 13+30
- c. Entrance inverts \*
- d. Exit inverts 141.6 M.S.L.
- e. Emergency draindown facilities Stem operated gate at El. 145 M.S.L.

HYDROMETEOROLOGICAL GAGES: None

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE: 1350 CFS

\* Weir crest at El. 175; H.S. orifice at El. 172.2; 30"  $\phi$  RCP entrance at 143 MSL. (pipe invert)



BY D. J. M. DATE 1-79  
 CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SUBJECT \_\_\_\_\_

**LOUIS BERGER & ASSOCIATES INC.**

ASSURANCE # 12 DAM INSPECTION

SHEET NO. A1 OF \_\_\_\_\_  
 PROJECT C227

Time of concentration as computed by SCS

Time of Concentration -- Tc				
(1) Description of Course of Runoff Water	(2) Slope of Course (%)	(3) Length (1) of Course (ft)	(4) Velocity of Runoff Water (v) (ft/sec)	(5) Time (sec) (3) ÷ (4)
OVERLAND-WOODS	12.5	500	1.7	294
OVERLAND-WOODS	2	1500	0.5	3000
CHANNEL FLOW	0.012	<del>6800</del>	2.5	<del>2720</del>
		5300		2120
Sum				<del>6014</del> 5414

$$T_c = \frac{5414}{3600} = 1.50 = 1.67 \text{ hrs.}$$

236

$$T_p = \frac{0.25}{2} + 0.6 \times 1.5 = 1.03 \text{ hours}$$

$$Q_p = \frac{484 \times 1.21 \times 1}{1.03} = 569$$

BY D. J. M. DATE 1-79  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.

ASSOUNDINK SITE #18 DAM INSPECTION

SHEET NO. 12 OF \_\_\_\_\_  
PROJECT C227

UNIT GRAPH

<u>T</u>	<u>T/T<sub>p</sub></u>	<u>Dimensionless Ordinate</u> <u>(D.O.)</u>	<u>Q<sub>p</sub> × D.O.</u> <u>= Q</u>
0.25	0.24	0.1	57
0.50	0.49	0.41	233
0.75	0.73	0.81	461
1.00	0.97	0.99	563
1.25	1.21	0.91	518
1.50	1.46	0.69	393
1.75	1.70	0.48	273
2.00	1.94	0.35	199
2.25	2.18	0.24	137
2.50	2.43	0.17	97
2.75	2.67	0.118	67
3.00	2.91	0.085	48
3.25	3.16	0.062	35
3.50	3.40	0.0438	25
3.75	3.64	0.0310	18
4.00	3.88	0.0223	13



BY D.J.M. DATE 1-79

LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. A3 OF

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

PROJECT 5227

SUBJECT \_\_\_\_\_

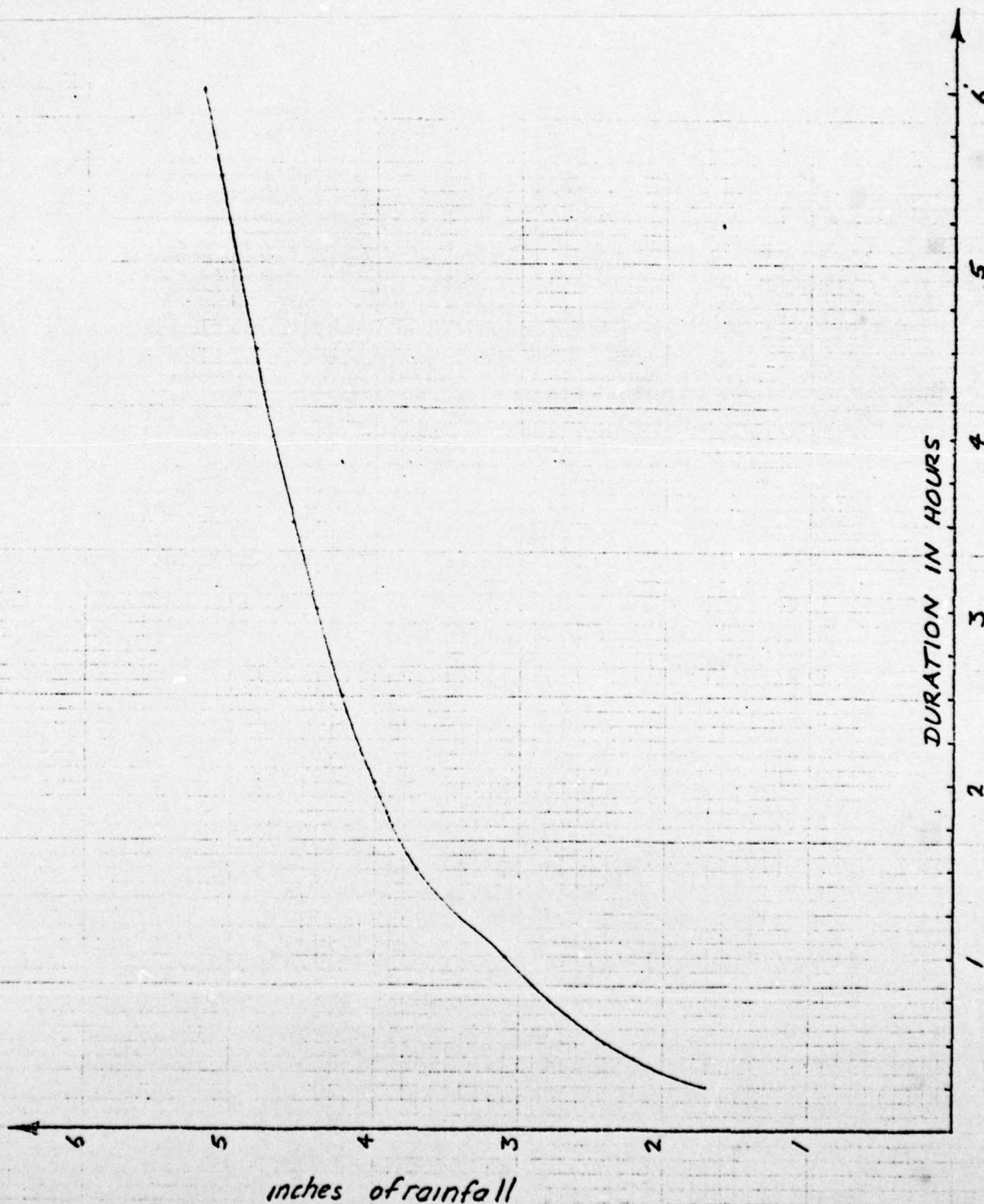
PRECIPITATION DATA FROM T.P 40 (see depth duration curve overleaf)  
8 HMR 35

Time	Precipitation	$\Delta$	Rearrange
0.25	1.7	1.7	0.06
0.50	2.4	0.7	0.06
0.75	2.8	0.4	0.06
1.00	3.1	0.3	0.06
1.25	3.5	0.4	0.07
1.50	3.7	0.2	0.07
1.75	3.86	0.16	0.08
2.00	4.00	0.14	0.09
2.25	4.11	0.11	0.09
2.50	4.22	0.11	0.09
2.75	4.31	0.09	0.11
3.00	4.40	0.09	0.11
3.25	4.49	0.09	0.30
3.50	4.57	0.08	0.70
3.75	4.64	0.07	1.70
4.00	4.71	0.07	0.40
4.25	4.78	0.07	0.40
4.50	4.84	0.06	0.20
4.75	4.90	0.06	0.16
5.00	4.96	0.06	0.14
5.25	5.02	0.06	0.07
5.50	5.08	0.06	0.06
5.75	5.14	0.06	0.06
6.00	5.20	0.06	0.06

BY D. J. M DATE 1-79  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

SUBJECT T.P. 40 & H.M.R. 35  
DEPTH DURATION CURVE

SHEET NO. 14 OF \_\_\_\_\_  
JOB NO. C227





SUBJECT.....SCS SA

## SCS SPILLWAY DISCHARGE CAPACITIES

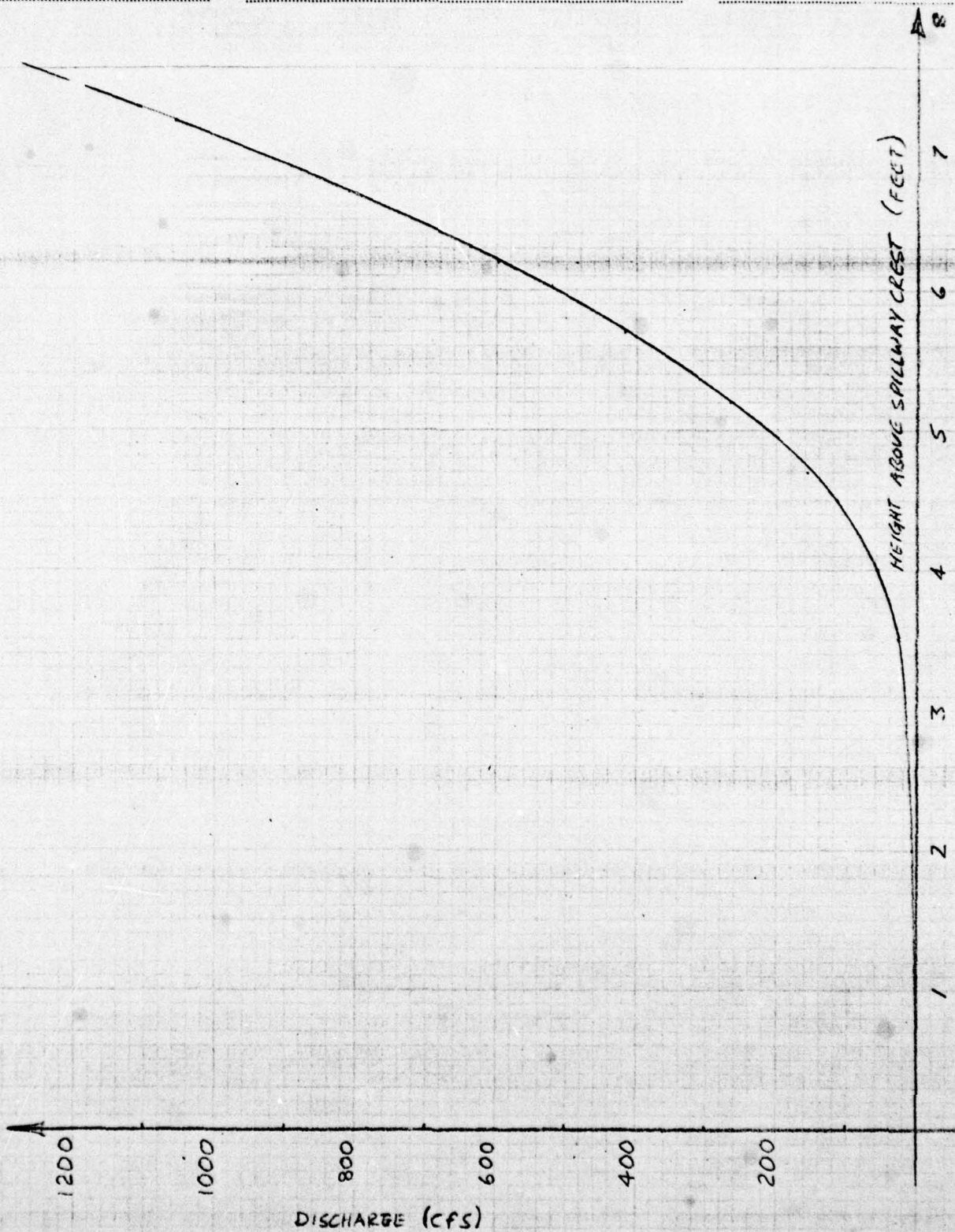
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[illegible]

BY D.J.M. DATE 1-79  
CHKD. BY DATE

SUBJECT STAGE DISCHARGE CURVE  
ASSUNPINK SITE #18 DAM INSPECTION

SHEET NO. A6 OF  
JOB NO. C227





BY D.J.M. DATE 1-79

## LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. A7 OF

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

ASSURANCE SITE #18 DAM INSPECTION

PROJECT C 227

SUBJECT \_\_\_\_\_

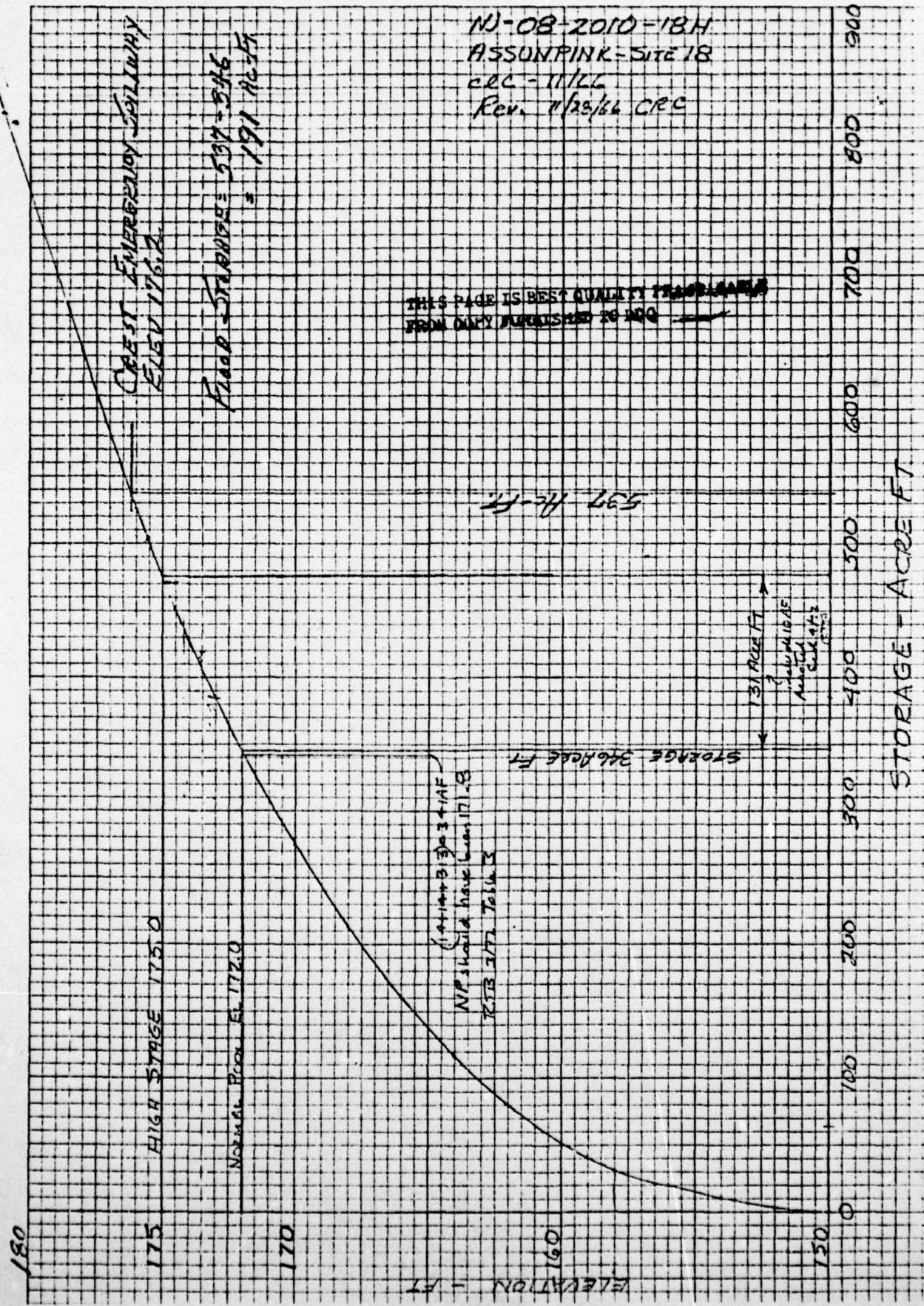
THIS PAGE IS BEST QUALITY PRACTICES  
FROM COPY FURNISHED TO DDOSTORAGE DATA AS COMPUTED BY SCS

<u>Elevation</u> <u>(M.S.L.)</u>	<u>Storage</u> <u>(ACRE FEET)</u>	<u>Surcharge Storage</u> <u>(ACRE FEET)</u>
172	346	0
173	395	49
174	430	84
175	477	131
176	530	184
177	580	234
178	640	294
179	700	354
180	765	419

675  
537  
138

MADE IN U. S. A.

10 X 10 PER INCH





BY D.J.M. DATE 1-79

LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. 19 OF

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

ASSUMPTION SITE #15 DAM INSPECTIONPROJECT C227

SUBJECT \_\_\_\_\_

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Summary of storage &amp; discharge data for HEC-1 input

<u>HEIGHT ABOVE CREST (feet)</u>	<u>STORAGE (ACRE FEET)</u>	<u>DISCHARGE (cfs)</u>
0	0	0
1	49	4
2	84	7
3	131	9
4	184	57
5	234	210
6	294	520
7	354	950
8	419	1500

BY L.B. DATE FEB '79

LOUIS BERGER &amp; ASSOCIATES INC.

SHEET NO. A10 OF

CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_

ASSONPINK SITE #13PROJECT C-227SUBJECT DRAWDOWN CALCULATIONS

## DRAWDOWN FROM NORMAL POOL ELEVATION

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ELEV. FT	TOTAL STORAGE ACRE-FT	DIFF STORAGE ACRE-FT	DISCHARGE		AVERAGE DISCHARGE ACREFT/DAY	DRAWDOWN TIME DAYS
			ACTUAL CFS	AVG. CFS		
172	346		25			
		132		24.1	47.8	2.76
168	214		23.1			
		97		22.1	43.83	2.21
164	117		21			
		64		19.8	39.27	1.63
160	53		18.6			
		33		17.3	34.31	.96
156	20		16			
		16		14.4	28.56	.56
152	4		12.7			
		3		10.5	20.83	.14
148	1		8.3			
		1		4.15	8.23	.12
145	0		0			

 $\Sigma 8.39$ 

$$Q = CA \sqrt{2gH}$$

C=.6

$$A = 1A^2$$

$$Q = 4.815 H^{1/2}$$

say 9 days



BY DJM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.  
ASSUNPINK SITE #18

SHEET NO. A-11 OF \_\_\_\_\_  
PROJECT C-227

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ASSUNPINK SITE #18, 19, 20 DAM INSPECTIONS NORTH GROUP  
BY D.J. MULLIGAN  
FEBRUARY 1979

JOB SPECIFICATION  
NO NHR MWIN ICAY IHR IKIN METRC IP I PRT NSTAR  
150 0 15 0 0 0 0 0 0 0 0 0  
JOPER 3 NWT 0

SUB-AREA RUNOFF COMPUTATION

INFLOW TO DAM 18  
ISTAG 1 ICOWP 0 IECON 0 ITAPE 0 JPLT 0 JPLT INAME 1

HYDROGRAPH DATA  
IHYOG 0 IUNG TAREA SNAP TRSDA TRSPC RATIO ISNOW ISAME LOCAL  
-1 1.21 0.0 1.21 0.0 0.0 0 0 0

PRECIP DATA

XP STORM DAJ DAK  
24 0.0 0.0 0.0

PRECIP PATTERN

0.06 0.06 0.06 0.07 0.67 0.08 0.09 0.09 0.09  
0.11 0.30 0.70 1.70 0.40 0.40 0.20 0.16 0.14  
0.07 0.06 0.06

LOSS DATA

STERR 0.0 DLTRP RTIOL ERAIN STKRS RIIOK STYL CNSTL ALSMX RTIMP  
0.0 0.0 1.00 0.0 0.0 1.00 0.50 0.10 0.0 0.0

57. 233. 461. 563. 518. 393. 273. 199. 137. 97.  
67. 48. 35. 25. 18. 13.  
UNIT GRAPH TOTALS 3137. CFS OR 1.00 INCHES OVER THE AREA

RECESSION DATA

STRICE 0.0 GRCSN= 0.0 RTIOW= 1.00

END-OF-PERIOD FLOW

TIME RAIN EYCS COMP 0  
1 0.06 0.00 0.  
2 0.06 0.00 0.  
3 0.06 0.00 0.  
4 0.06 0.00 0.  
5 0.07 0.00 0.  
6 0.07 0.00 0.  
7 0.08 0.00 0.  
8 0.09 0.04 2.  
9 0.09 0.06 12.

BY DJM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

**LOUIS BERGER & ASSOCIATES INC.**

ASSUMPTION SITE #12

SHEET NO. A-12 OF \_\_\_\_\_  
PROJECT 0-227

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10	0.09	0.06	35.
11	0.11	0.08	70.
12	0.11	0.08	110.
13	0.30	0.27	159.
14	0.70	0.67	259.
15	1.70	1.67	522.
16	0.40	0.37	591.
17	0.40	0.37	1485.
18	0.20	0.18	1727.
19	0.16	0.13	1681.
20	0.14	0.11	1450.
21	0.07	0.05	1181.
22	0.06	0.04	943.
23	0.06	0.04	735.
24	0.06	0.04	566.
25	0.0	0.0	431.
26	0.0	0.0	329.
27	0.0	0.0	247.
28	0.0	0.0	180.
29	0.0	0.0	126.
30	0.0	0.0	94.
31	0.0	0.0	44.
32	0.0	0.0	28.
33	0.0	0.0	17.
34	0.0	0.0	10.
35	0.0	0.0	6.
36	0.0	0.0	3.
37	0.0	0.0	2.
38	0.0	0.0	1.
39	0.0	0.0	0.
40	0.0	0.0	0.
41	0.0	0.0	0.
42	0.0	0.0	0.
43	0.0	0.0	0.
44	0.0	0.0	0.
45	0.0	0.0	0.
46	0.0	0.0	0.
47	0.0	0.0	0.
48	0.0	0.0	0.
49	0.0	0.0	0.
50	0.0	0.0	0.
51	0.0	0.0	0.
52	0.0	0.0	0.
53	0.0	0.0	0.
54	0.0	0.0	0.
55	0.0	0.0	0.
56	0.0	0.0	0.
57	0.0	0.0	0.
58	0.0	0.0	0.
59	0.0	0.0	0.
60	0.0	0.0	0.
61	0.0	0.0	0.
62	0.0	0.0	0.
63	0.0	0.0	0.
64	0.0	0.0	0.
65	0.0	0.0	0.
66	0.0	0.0	0.
67	0.0	0.0	0.
68	0.0	0.0	0.
69	0.0	0.0	0.
70	0.0	0.0	0.



BY RLM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.

ASSUNPINK SITE # 13

SHEET NO. A-13 OF \_\_\_\_\_  
PROJECT C-227

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71	0.0	0.0	0.
72	0.0	0.0	0.
73	0.0	0.0	0.
74	0.0	0.0	0.
75	0.0	0.0	0.
76	0.0	0.0	0.
77	0.0	0.0	0.
78	0.0	0.0	0.
79	0.0	0.0	0.
80	0.0	0.0	0.
81	0.0	0.0	0.
82	0.0	0.0	0.
83	0.0	0.0	0.
84	0.0	0.0	0.
85	0.0	0.0	0.
86	0.0	0.0	0.
87	0.0	0.0	0.
88	0.0	0.0	0.
89	0.0	0.0	0.
90	0.0	0.0	0.
91	0.0	0.0	0.
92	0.0	0.0	0.
93	0.0	0.0	0.
94	0.0	0.0	0.
95	0.0	0.0	0.
96	0.0	0.0	0.
97	0.0	0.0	0.
98	0.0	0.0	0.
99	0.0	0.0	0.
100	0.0	0.0	0.
101	0.0	0.0	0.
102	0.0	0.0	0.
103	0.0	0.0	0.
104	0.0	0.0	0.
105	0.0	0.0	0.
106	0.0	0.0	0.
107	0.0	0.0	0.
108	0.0	0.0	0.
109	0.0	0.0	0.
110	0.0	0.0	0.
111	0.0	0.0	0.
112	0.0	0.0	0.
113	0.0	0.0	0.
114	0.0	0.0	0.
115	0.0	0.0	0.
116	0.0	0.0	0.
117	0.0	0.0	0.
118	0.0	0.0	0.
119	0.0	0.0	0.
120	0.0	0.0	0.
121	0.0	0.0	0.
122	0.0	0.0	0.
123	0.0	0.0	0.
124	0.0	0.0	0.
125	0.0	0.0	0.
126	0.0	0.0	0.
127	0.0	0.0	0.
128	0.0	0.0	0.
129	0.0	0.0	0.
130	0.0	0.0	0.
131	0.0	0.0	0.
132	0.0	0.0	0.
133	0.0	0.0	0.
134	0.0	0.0	0.
135	0.0	0.0	0.
136	0.0	0.0	0.
137	0.0	0.0	0.
138	0.0	0.0	0.
139	0.0	0.0	0.
140	0.0	0.0	0.

BY DJM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.

ASSUNPINK SITE #18

SHEET NO. A-14 OF \_\_\_\_\_  
PROJECT \_\_\_\_\_

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141 0.0 0.0 0.0  
142 0.0 0.0 0.0  
143 0.0 0.0 0.0  
144 0.0 0.0 0.0  
145 0.0 0.0 0.0  
146 0.0 0.0 0.0  
147 0.0 0.0 0.0  
148 0.0 0.0 0.0  
149 0.0 0.0 0.0  
150 0.0 0.0 0.0

SUM 5.20 4.26 13444.

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME  
1729. 559. 140. 90. 13445.  
CFS 4.31 4.31 4.31  
INCHES 277. 278. 278. 278.  
AC-FT

\*\*\*\*\*

HYDROGRAPH ROUTING

ROUTING THROUGH 18

ISTAG ICOMP IECON ITAPE JPLT JPRT INAME  
0 1 0 0 0 0 1

ROUTING DATA  
GROSS CLOSS AVG IRES ISAME  
0.0 0.0 0.0 1 0

MSIPS MSTDL LAG ANSKK X TSK STORA  
1 0 0 0.0 0.0 0.0 0.

STORAGE 0. 49. 84. 131. 184. 234. 294. 354. 419.  
OUTFLOW 0. 4. 7. 9. 57. 210. 520. 950. 1500.

TIME EOP STOR AVG IN EOP OUT  
1 0. 0. 0. 0.  
2 0. 0. 0. 0.  
3 0. 0. 0. 0.  
4 0. 0. 0. 0.  
5 0. 0. 0. 0.  
6 0. 0. 0. 0.  
7 0. 0. 0. 0.  
8 0. 0. 0. 0.  
9 0. 0. 0. 0.  
10 1. 24. 7. 0.  
11 1. 53. 24. 0.  
12 2. 90. 53. 0.  
13 4. 135. 90. 0.  
14 11. 209. 135. 1.  
15 11. 209. 135. 1.



BY DJM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

# LOUIS BERGER & ASSOCIATES INC.

ASSUNPINK SITE #12

SHEET NO. 4-15 OF \_\_\_\_\_  
PROJECT \_\_\_\_\_

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15	19.	390.	2.	76	161.	0.	36.
16	34.	755.	3.	77	160.	0.	34.
17	60.	1238.	5.	78	160.	0.	35.
18	93.	1607.	7.	79	159.	0.	34.
19	128.	1705.	9.	80	158.	0.	34.
20	160.	1565.	35.	81	157.	0.	33.
21	186.	1316.	63.	82	157.	0.	32.
22	206.	1065.	125.	83	156.	0.	32.
23	220.	842.	168.	84	155.	0.	31.
24	230.	651.	198.	85	155.	0.	31.
25	236.	498.	221.	86	154.	0.	30.
26	239.	380.	237.	87	154.	0.	29.
27	240.	288.	242.	88	153.	0.	29.
28	240.	213.	239.	89	152.	0.	28.
29	238.	153.	230.	90	152.	0.	28.
30	235.	105.	218.	91	151.	0.	27.
31	232.	64.	205.	92	151.	0.	27.
32	229.	36.	195.	93	150.	0.	26.
33	226.	22.	184.	94	150.	0.	26.
34	222.	13.	174.	95	149.	0.	25.
35	219.	8.	164.	96	149.	0.	25.
36	216.	5.	154.	97	148.	0.	24.
37	213.	3.	145.	98	148.	0.	24.
38	210.	2.	136.	99	147.	0.	24.
39	207.	1.	128.	100	147.	0.	23.
40	205.	0.	120.	101	146.	0.	23.
41	202.	0.	112.	102	146.	0.	22.
42	200.	0.	106.	103	145.	0.	22.
43	198.	0.	99.	104	145.	0.	21.
44	196.	0.	93.	105	144.	0.	21.
45	194.	0.	87.	106	144.	0.	21.
46	192.	0.	82.	107	143.	0.	20.
47	191.	0.	77.	108	143.	0.	20.
48	189.	0.	72.	109	143.	0.	20.
49	188.	0.	68.	110	142.	0.	19.
50	186.	0.	64.	111	142.	0.	19.
51	185.	0.	60.	112	141.	0.	18.
52	184.	0.	57.	113	141.	0.	18.
53	183.	0.	56.	114	141.	0.	18.
54	181.	0.	55.	115	140.	0.	17.
55	180.	0.	54.	116	140.	0.	17.
56	179.	0.	53.	117	140.	0.	17.
57	178.	0.	52.	118	139.	0.	16.
58	177.	0.	51.	119	139.	0.	16.
59	176.	0.	50.	120	139.	0.	16.
60	175.	0.	49.	121	138.	0.	16.
61	174.	0.	48.	122	138.	0.	15.
62	173.	0.	47.	123	138.	0.	15.
63	172.	0.	46.	124	137.	0.	15.
64	171.	0.	45.	125	137.	0.	14.
65	170.	0.	44.	126	137.	0.	14.
66	169.	0.	44.	127	136.	0.	14.
67	168.	0.	43.	128	136.	0.	14.
68	167.	0.	42.	129	136.	0.	13.
69	167.	0.	41.	130	136.	0.	13.
70	166.	0.	41.	131	135.	0.	13.
71	165.	0.	40.	132	135.	0.	13.
72	164.	0.	39.	133	135.	0.	12.
73	163.	0.	38.	134	135.	0.	12.
74	163.	0.	38.	135	134.	0.	12.
75	162.	0.	37.	136	134.	0.	12.

BY DJM DATE \_\_\_\_\_  
CHKD. BY \_\_\_\_\_ DATE \_\_\_\_\_  
SUBJECT \_\_\_\_\_

LOUIS BERGER & ASSOCIATES INC.

ASSUMPTION SITE #12

SHEET NO. A-16 OF \_\_\_\_\_  
PROJECT C-227

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137	134.	0.	12.
138	134.	0.	11.
139	133.	0.	11.
140	133.	0.	11.
141	133.	0.	11.
142	133.	0.	11.
143	132.	0.	10.
144	132.	0.	10.
145	132.	0.	10.
146	132.	0.	10.
147	132.	0.	10.
148	131.	0.	9.
149	131.	0.	9.
150	131.	0.	9.

SUM

7106.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	242.	166.	69.	47.	7106.
INCHES		1.27	2.13	2.28	2.26
AC-FT		82.	137.	147.	147.